IS 15508 (2004): Refractory Mass (Basic Gunning) for Steel Plant Application [MTD 15: Refractories]

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Indian Standard

REFRACTORY MASS (BASIC GUNNING) FOR STEEL PLANT APPLICATION — SPECIFICATION

ICS 81.080

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 2004

Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Refractories Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard has been prepared for specifying the requirements of basic gunning for steel plant application. Three types of basic gunning materials. Type 1 for steel ladle, Type 2 for LD converter and Type 3 for EAF/EOF/LD converter (bigger size) including their methods of sampling have been specified in this standard.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

REFRACTORY MASS (BASIC GUNNING) FOR STEEL PLANT APPLICATION — SPECIFICATION

1 SCOPE

This standard covers the requirements for three types of refractory mass (basic gunning) material including the method of sampling.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1528	Method of sampling and physical tests for refractory materials:
(Part 1) : 1980	Determination of pyrometric cone equivalent (PCE) or softening point (*second revision*)
(Part 2) : 1974	Determination of refractoriness under load (*first revison*)
(Part 4) : 1974	Determination of cold crushing strength (*first revison*)
(Part 11) : 1974	Determination of refractoriness under load (*second revision*)
(Part 14) : 1974	Determination of sieve analysis (*first revision*)
10047 : 1981	Methods of testing refractory ramming masses
1760	Methods of chemical analysis of limestone, dolomite and allied materials:
(Part 1) : 1991	Determination of loss on ignition (*first revision*)
(Part 2) : 1991	Determination of silica (*first revision*)
(Part 3) : 1992	Determination of iron oxide, alumina, calcium oxide and magnesia (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Gunning Mass — It is a mixture of graded refractory aggregate with chemical binders, sintering and plasticizers.

3.2 Lot — In any consignment, all the containers containing gunning material of the same type and grade, manufactured by the same firm under similar conditions of production shall be grouped together to constitute a lot. The maximum mass of any lot, however, shall be 25 tonne.

4 SAMPLING

4.1 For the complete series of tests, a minimum sample of about 50 kg is required. Consignments of these materials are usually supplied in 25 kg container/bags and the number of container/bags, as samples, shall be selected at random on the following basis:

Mass of Lot (Tonne)		*No. of 25* kg *Container/ Bags to be Selected as Sample*[1)]
Over	*Up to and including*	
0	1	1
1	4	2
4	25	5

[1)]Each container/bag sample shall be made available from at least 10 locations randomly.

4.2 The selected containers/bags shall be emptied on a suitable surface and material be thoroughly mixed and divided by the process of coning and quartering method. The sample shall be reduced to 50 kg in the case of lot size up to 10 tonnes and 75 kg in the case of lot size over 10 tonnes. This final sample shall be divided equally into eight test samples by successive coning used for various physical tests, sieve analysis, bulk density, cold crushing strength, permanent linear change and pyrometric cone equivalent. It may also be noted that same test sample may be used for more than one test if permitted by respective test methods.

5 TYPES

Basic gunning masses will be of following types with chemico-ceramic binder system:

Type 1 : 82 percent MgO
Type 2 : 90 percent MgO
Type 3 : 95 percent MgO

6 CHEMICAL COMPOSITION

The magnesia and silica contents of three types of gunning masses when determined in accordance with the method given in relevant parts of IS 1760 shall be as given in Table 1.

Table 1 Chemical Composition

Sl No.	Constituent, Percent	Type 1	Type 2	Type 3
(1)	(2)	(3)	(4)	(5)
i)	MgO, *Min*	82	90	95
ii)	SiO_2, *Max*	9	4	3
iii)	Al_2O_3, *Max*	4	1	—
iv)	Fe_2O_3, *Max*	1.5	1.5	1.0
v)	CaO, *Max*	2.0	1.5	1.0
vi)	$Na_2O + K_2O$, *Max*	0.1	0.1	0.1
vii)	LOI	1	0.5	0.3

7 PHYSICAL TEST REQUIREMENTS

Basic gunning mass, when tested in accordance with test methods (*see* Table 2) shall conform to the requirements as given in col 3 of Table 2.

8 PACKING

The material masses shall be packed in polythene lined HDPE bags/ containers of suitable mass.

9 MARKING

9.1 All bags shall be marked with:

a) Manufacturer's name and/or trade-mark;
b) Product name and its type;
c) Net mass of material; and
d) Month and year of manufacture.

9.2 BIS Certification Marking

The material may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 2 Physical Test Requirement
(*Clause* 7)

Sl No.	Characteristic	Type 1	Type 2	Type 3	Test Method
(1)	(2)	(3)	(4)	(5)	(6)
i)	Grain size, mm	0-4	0-4	0-4	IS 1528 (Part 14)
ii)	Percentage, retained above maximum size, *Max*	5	5	5	IS 1528 (Part 14)
iii)	Bulk density, gm/cc, at 110°C/ 24 h, *Min*	2.55	2.6	2.63	IS 10047
iv)	Cold crushing strength kg/cm^2 at :				
	110°C/24 h, *Min*	300	300	400	IS 10047
	1 550°C/3 h, *Min*	250	250	300	
v)	Refractoriness (Orton/°C), *Min*	38/ 1 835	38/ 1 835	38/ 1 835	IS 1528 (Part 2)
vi)	Permanent linear change (%) at 1 550°C C/3 h	± 1.0	± 0.8	± 0.8	IS 10047
vii)	Maximum Service temperature (°C)	1 700	1 750	1 750	—
viii)	Water required (%) for gunning	6-9	6-9	6-8	—
ix)	Shelf life (month), or storage life (month), *Min*	6	6	6	—

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This Indian Standard has been developed from Doc : No. **MTD 15 (4420).**

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at Prabhat Offset Press, New Delhi-2